भारतीय मानक

Indian Standard

IS 18347 : 2023

खतरा ज्ञात करना और जोखिम निर्धारण (रासायनिक उद्योगों के अलावा) — रीति संहिता

Hazard Identification and Risk Assessment (Other than Chemical Industries) — Code of Practice

ICS 13.100

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Occupational Safety and Health Sectional Committee, CHD 08

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Occupational Safety and Health Sectional Committee had been approved by the Chemical Division Council.

It has been identified that, as a preventive measure to minimize accident occurrence in hazardous installations and thereby reduce the probability of injury, loss of material and degradation of the environment, it is necessary to use more searching and systematic methods for risk control to supplement existing procedures for identification of hazards and assessment of risks.

Risk assessment is carried out by combination of hazard analysis, consequence analysis and probability calculations. All employers and self-employed people have a legal duty/obligation to assess the risks from their work activities.

The risk assessment procedure is useful for situations where the hazards pose a significant threat and it is uncertain whether the existing or planned controls are adequate in principle or in practice; and for organizations seeking continual improvement in their occupational health and safety (OH&S) management systems in addition to meeting legal requirements.

This standard therefore describes specific techniques to prevent human and property losses in the operation and management of industrial activities through systematic identification of hazards as well as quantification of the risks associated with the operation of plants (other than chemical industries).

A separate Indian Standard IS 15656 : 2006 Hazard Identification and Risk Assessment — Code of practice would be applicable for hazards related to chemical process plants.

The composition of the Committee responsible for formulation of this standard is given in Annex A.

Indian Standard

HAZARD IDENTIFICATION AND RISK ASSESSMENT (OTHER THAN CHEMICAL INDUSTRIES) — CODE OF PRACTICE

1 SCOPE

This standard provides guidelines for identification/assessment of all hazards related to industrial activities (except chemical Industries) and for assessment of associated risk.

2 REFERENCES

The standards given below contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated was valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of this standard:

IS No.	*Title*
IS 15656 : 2006	Hazard identification and risk analysis — Code of practice

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 15656 shall apply.

4 APPLICATION AND OVERVIEW

4.1 Application

All employers and self-employed people have a legal duty to assess the risks from their work activities. The risk assessment procedure described in this standard is intended to be used:

a) for situations where the hazards pose a significant threat and it is uncertain whether the existing or planned controls are adequate in principle or in practice; and
b) by organizations seeking continual improvement in their OH&S management systems in addition to meeting legal requirements.

The full procedure described in this standard is not necessary or cost-effective when it is quite clear from preliminary study that risks are trivial, or a previous assessment has shown that, existing or planned controls:

a) conform to the legal requirements as well as established standards;
b) are appropriate for the tasks; and
c) are, or will be, understood and used by everyone concerned.

Here no further action is required other than to ensure, that controls continue to be used. Small, low risk organizations in particular should be highly selective in the risks that they choose to assess in detail.

Effort developed for assessment of trivial risks or for evaluation of standard controls will lead to collection of more information that can possibly be used, and to situations where important facts are lost in a mass of spurious documentation.

4.2 Overview

4.2.1 *Basic Steps*

The following steps are followed in identification of hazard and assessment and control of risk:

a) Identify hazards;
b) Estimate the risk (the likelihood and severity of harm) from each hazardous event; and
c) Decide if the risk is tolerable (for this purpose a tolerable risk criterion should be evolved which should take into consideration the legal requirements and other norms in that activity).

4.2.2 *Necessity*

Employers are legally obliged to carry out OH&S risk assessments. Their main purpose is to determine whether planned or existing controls are adequate. The intention is that risks should be controlled before harm can occur.

For many years OH&S risk assessments have been carried out on an informal basis. It is now recognized that risk assessment is a key foundation for pro-active OH&S management and that systematic procedures are necessary to ensure their success.

A risk assessment based on a participative approach provides an opportunity for management and the work force to agree that an organization’s OH&S procedures:

a) are based on shared perceptions of hazards and risks;
b) are necessary and workable; and
c) will succeed in preventing accidents.

4.2.3 *Pitfalls and Solutions*

Poorly planned assessments, carried out in brief due to bureaucratic impositions, will waste time and change nothing. Moreover, organizations may get bogged down in detail, where completion of assessment proforma becomes a herculean task in itself. Risk assessment should provide an inventory for action and form the basis for implementing control measures. Potential risk assessors may have become complacent. People who are too close to situations may no longer perceive and recognize hazards, or perhaps judge risks as trivial because to their knowledge no one has been harmed. The aim should be that everyone tackles risk assessments with a fresh questioning approach. Risk assessment should be carried out by competent people with practical knowledge of the work activities, preferably with colleagues from another part of the organization, who may have greater objectivity. A worthwhile approach, whenever possible, is to train small teams to carry out assessments.

Ideally, everyone should contribute to assessments that relate to them. For example, they should tell assessors what they think about the need for and feasibility of particular risk controls. In larger organizations a competent person, usually from within the organization, should coordinate and guide the assessors' work. Specialist advice may need to be sought.

NOTE — Pitfall of simple risk concept is that it cannot distinguish high probability low consequence events from low probability high consequence events.

5 PRINCIPLE

5.1 Figure 1 shows the principle of risk assessment. The steps are outlined below and described fully in **4.2**, **5** and **6**.

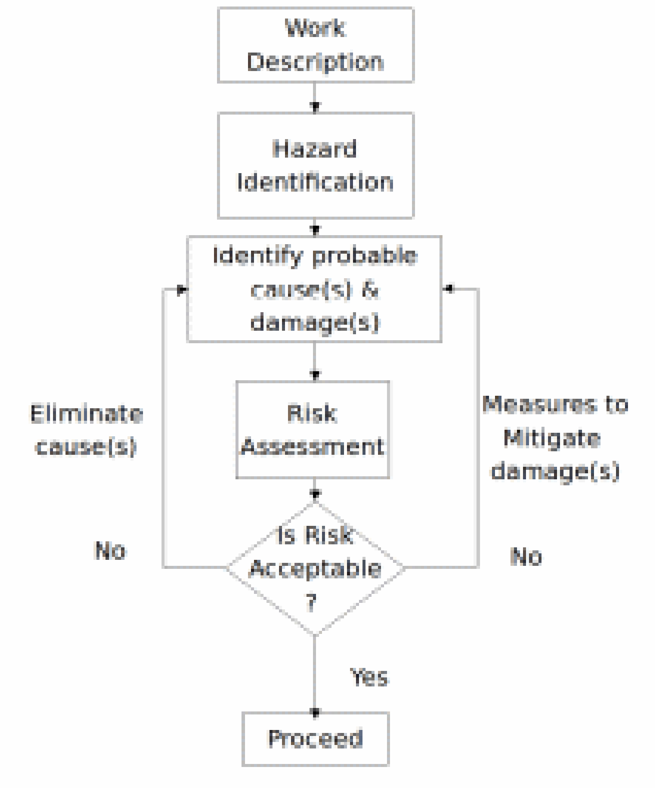

FIG. 1 PRINCIPLE OF RISK ASSESSMENT

5.2 The following criteria are necessary for organizations to carry out effective risk assessment:

a) *Classify work activities* — Prepare a list of work activities covering plant, raw materials/chemicals handled, premises, people and procedures, and gather information about them;

b) *Identify hazards* — Identify all hazards relating to each work activity. Consider who might be harmed and how; what might be damaged and how;

c) *Determine risk* — Make a subjective estimate of risk associated with each hazard assuming that planned or existing controls are in place. Assessors should also consider the effectiveness of the controls and the consequences of their failure;

d) *Decide if risk is tolerable* — Judge whether planned or existing OH&S precautions (if any) are sufficient to keep the hazard under control and meet legal requirements;

e) *Prepare risk control action plan* (*if necessary*) — Prepare a plan to deal with any issues found by the assessment to require attention. Organizations should ensure that new and existing controls remain in place and are effective; and

f) *Review adequacy of action plan* — Re-assess risks on the basis of the revised controls and check that risks will be tolerable.

NOTE — The word 'tolerable' here means that risk has been reduced to the lowest level that is reasonably practicable.

5.3 Risk Assessment Requirements

If risk assessment is to be useful in practice organizations should:

a) appoint a senior member of the organization to promote and manage the activity;

b) consult with everyone concerned; discuss what is planned to be done and obtain their comments and commitment;

c) determine risk assessment training needs for assessment personnel/teams and implement a suitable training programme;

d) review adequacy of assessment; determine whether the assessment is suitable and sufficient; that is to say, adequately detailed and rigorous; and

e) document administrative details and significant findings of the assessment.

It is generally not necessary to make precise numerical calculation of risk. Complex methods for quantified risk assessment are normally required only where the consequences of failure could be catastrophic. Risk assessment in major hazard industries is related to the approach required in other workplaces, but in most organizations much simpler subjective methods are appropriate.

The assessment of risks to health associated with exposure to toxic substance and harmful emissions may require, for example, measurements of airborne dust concentrations or noise exposure.

6 PROCEDURE

6.1 General

The sub clause describes the factor that an organization should consider when planning the risk assessment. Attention is drawn to the need to refer to relevant regulations and guidance to ensure that specific legal requirements are met. The risk assessment process described here covers all OH&S hazards. It is better to integrate assessment for all hazards, and not carry out separate assessment for health hazards, manual handling machinery hazards and so on. If assessment is carried out separately, using different methods, ranking risk control priorities is more difficult separate assessment may also lead to needless duplication.

The following aspects of risk assessment need to be considered carefully at the outset:

a) Design of a simple risk assessment proforma (*see* **6.2**);

b) Criteria for classifying work activities and information needed about each work activity (*see* **6.3** and **6.4**);

c) Method of identification and categorization hazards (*see* **7.1**);

d) Procedures for making an informed determination of risk (*see* **7.1**);

e) Words to describe estimated risk levels (*see* Tables 1 and 2);

f) Criteria for deciding whether risks are tolerable: whether planned or existing control measures are adequate (*see* **8.1**);

g) Preferred methods for risk control (*see* **8.2**);

h) Time scales for implementing remedial action (where necessary) (*see* Table 2); and

j) Criteria for reviewing adequacy of action plan (*see* **8.3**).

6.2 Risk Assessment Proforma

Organizations should prepare a simple proforma that can be used to record the findings of an assessment, typically covering:

- a) work activity;
- b) hazard(s);
- c) controls in place;
- d) personnel at risk;
- e) likelihood of harm;
- f) severity of harm;
- g) risk level;
- h) action to be taken following the assessment; and
- j) administrative details, for example name of assessor, date, etc.

Organizations should develop their overall risk assessment procedure and may need to carry out trials and continually review the system.

6.3 Classification of Work Activities

A necessary preliminary to risk assessment is to prepare a list of work activities, to group them in a rational and manageable way, and to gather necessary information about them. It is vital to include, for example, infrequent maintenance tasks, as well as day-to-day production work. Possible ways of classifying work activities include,

- a) geographical areas within/outside the organization's premises;
- b) stages in the production process, or in the provision of a service;
- c) planned and reactive work; and
- d) defined tasks (for example, driving).

6.4 Work Activity Information Requirements

Information required for each work activity should but are not limited to include items from the following:

- a) Tasks being carried out, their duration and frequency;
- b) Location(s) where the work is carried out;
- c) Who normally/occasionally carries out the tasks;
- d) Who else may be affected by the work (for example, visitors, subcontractors, the public);
- e) Training, that personnel have received about the tasks;
- f) Written systems of work and/or permit-to-work procedures prepared for the tasks;
- g) Plant and machinery that may be used;
- h) Powered hand tools that may be used.
- j) Manufacturers' or suppliers' instructions for operation and maintenance of plant machinery and powered hand tools;
- k) Size, shape, surface character and weight of materials that might be handled;
- m) Distance and heights of the place where materials have to be moved by hand
- n) Services used (for example, compressed air);
- p) Substances used or encountered during the work;
- q) Physical form of substances used or encountered (fume, gas, vapour, liquid, dust/powder, solid);
- r) Content and recommendations of safety data sheets relating to substances used or encountered;
- s) Relevant acts, regulations and standards relating to the work being done, the plant and machinery used, and the materials used or encountered;
- t) Control measures believed to be in place;
- u) Available monitoring data gained as a result of information from within and outside the organization, incident, accident and ill-health experience associated with the work being done, equipment and substances used; and
- v) Finding of any existing assessments relating to the work activity.

7 ANALYSING RISK

7.1 Identification of Hazards

7.1.1 *General*

Three questions enable hazard identification:

- a) Is there a source of harm?
- b) Who (or what) could be harmed? and
- c) How could harm occur?

Hazards that clearly possess negligible potential for harm should not be documented or given further consideration.

7.1.2 *Broad Categories of Hazard*

To help with the process of identifying hazards it is useful to categorize hazards in different ways for example:

- a) Mechanical;
- b) Electrical;
- c) Radiation;
- d) Substances;
- e) Fire and explosion;

f) Toxic release;
g) Natural calamities;
h) Physical, ergonomic; and
j) Biological.

7.1.3 *Hazard Prompt-List*

A complementary approach is to develop a prompt-list of questions such as:

During work activities could the following hazards exist?

a) Slips/falls on the level;
b) Falls of persons from heights;
c) Falls of tools, materials, etc, from heights;
d) Inadequate headroom;
e) Hazards associated with manual lifting/handling of tools, material, etc;
f) Hazards from plant and machinery associated with assembly, commissioning, operation, maintenance, modification, repair and dismantling;
g) Vehicle hazards, covering both site transport, and travel by road;
h) Fire and explosion;
j) Work place violence
k) Substances that may be inhaled;
m) Substances or agents that may damage the eye;
n) Substances that may cause harm by coming into contact with, or being absorbed through, the skin;
p) Substances that may cause harm by being ingested (for example, entering the body via the mouth);
q) Harmful energies (for example, electricity, radiation, noise, vibration);
r) Work-related upper limb disorders resulting from frequently repeated tasks;
s) Inadequate thermal environment, for example too hot;
t) Inadequate Lighting levels;
u) Slippery, uneven ground/surfaces; and
v) Inadequate guard rails or hand rails on stairs;

The above list is not exhaustive. Organizations should develop their own hazard ‘prompt-list’ taking into account the nature of their work activities and locations where work is carried out.

7.1.4 *Techniques of Hazard Identification and Analysis*

Adhering to good engineering practices alone, may not be adequate for controlling hazards. Thus, a variety of techniques have been developed for analysis of processes, systems and operations in order to identify and analyse associated hazards.

The objective of hazard identification is to identify and evaluate the hazards and the unintended events, which could cause an accident. The first task usually is to identify the hazards that are inherent to the process and/or operation and then focus on the evaluation of the events, which could be associated with hazards.

7.1.4.1 *Hazard identification*

Formal hazard identification studies generate a list of unintended consequences. The list can usually be derived reliably by considering: (a) the way the operation is carried out (b) nature of hazards it poses (c) the condition in which operation is carried.

The hazard identification methods may be categorized as comparative methods and fundamental methods.

7.1.4.2 *Comparative methods*

These methods are based on hazard identification by comparing with standards. The various methods are checklist, safety audit, hazard indices and preliminary hazard analysis.

a) Checklist:
    1) Purpose: For quick identification of hazards;
    2) Applicability: In all phases — design construction, commissioning, operation and shutdown;
    3) Data required: Checklist is prepared from prior experience/standard procedure manual/knowledge of system or plant;
    4) Results: Essentially qualitative in nature and leads to “yes-or-no” decision with respect to compliance with the standard procedure set forth.
b) Safety audit:
    1) Purpose: For ensuring that procedures match design intent;
    2) Applicability: In all phases of the plant and periodicity of review depending on the level of hazard;
    3) Data required: Applicable codes and guides, plant flow sheet, P and I diagram, start-up/shutdown procedure, emergency control, injury report, testing and inspection report, material properties; and
    4) Results: Qualitative in nature — The inspection teams report deviation from

design and planned procedures and recommends additional safety features.

- c) Hazard indices:
  - 1) Purpose: For identifying relative hazards;
  - 2) Applicability: In design and operation phase used as an early screening technique for fire/explosion potential;
  - 3) Data required: Plot plan of a plant, process flow condition, fire and explosion index form, risk analysis form, worksheets; and
  - 4) Results: Relative quantitative ranking of plant process units based on degree of risk.
- d) Preliminary hazard analysis:
  - 1) Purpose: For early identification of hazards;
  - 2) Applicability: In preliminary design phase to provide guidance for final design;
  - 3) Data required: Plant design criteria, hazardous materials involved and major plant equipment; and
  - 4) Results: List of hazards (related to available design details) with recommendation to designers to aid hazard reduction.

7.1.4.3 *Fundamental methods*

These methods are a structured way of stimulating a group of people to apply foresight along with their knowledge to the task of identifying the hazards mainly by raising a series of questions. These methods have the advantage that they can be used whether or not the codes of practice are available for a particular operation. Four main methods in this category are what-if analysis, failure modes and effects analysis (FMEA), job safety analysis (JSA) and hazard and operability study (HAZOP).

- a) What-if analysis:
  - 1) Purpose: Identifying possible event sequences related to hazards;
  - 2) Applicability: During plant design, development stage or at pre start-up stage;
  - 3) Data required: Detailed documentation of the plant, the process and the operating procedure; and
  - 4) Results: Tabular listing of accident scenarios, their consequences and possible risk reduction methods.
- b) Failure modes and effects analysis:
  - 1) Purpose: Identifying equipment failure modes and their effects;
  - 2) Applicability: In design, construction and operation phases, useful for plant modification;
  - 3) Data required: Knowledge of equipment/system/plant functions; and
  - 4) Results: Qualitative in nature and includes worst case estimate of consequence resulting from failure of equipment.
- c) Job safety analysis:
  - 1) Purpose: Identifying hazards in operations;
  - 2) Applicability: In design, construction and operation phases, useful for job modification;
  - 3) Data required: Knowledge of equipment/system/operation; and
  - 4) Results: Identification of hazards and operating problems, recommends change in design, procedure.
- d) Hazard and operability study:
  - 1) Purpose: Investigating how the system or plant deviate from the design intent and create risk for personnel and equipment and operability problems;
  - 2) Applicability: In design, construction and operation phases of processes, useful for plant modification;
  - 3) Data required: Detailed documentation of the plant P&ID, the process and the operating procedure; and
  - 4) Results: Qualitative in nature and includes worst case estimate of consequence resulting from failure of equipment.

7.1.4.4 *Hazard analysis*

The principal techniques are fault tree analysis (FTA) and event tree analysis (ETA):

- a) Fault Tree Analysis:
  - 1) Purpose: Identifying how basic events lead to an accident event;
  - 2) Applicability: In design and operation phases of the plant to uncover the failure modes;
  - 3) Data required: Knowledge of plant/system function, plant system failure modes and effects on plant system; and

   4) Results: Listing of set of equipment or operator failures that can result in specific accidents.
- b) Event tree analysis:
   1) Purpose: Identifying the event sequences from initiating event to accident scenarios;
   2) Applicability: In design/operating plants to assess adequacy of existing safety features;
   3) Data required: Knowledge of initiating events and safety system/emergency procedure; and
   4) Results: Provides the event sequence that result in an accident following the occurrence of an initiating event.

7.2 Determination of Risk

7.2.1 *General*

The risk from the hazard should be determined by estimating the potential severity to harm and the likelihood of occurrence of harm.

7.2.2 *Severity of Consequences*

Information obtained about work activities (*see* **6.4**) is a vital input to risk assessment. When seeking to establish potential severity, the following types of consequences should be considered.

7.2.2.1 *Bodily injury*

- a) Part(s) of the body likely to be affected;
- b) Nature of the harm, ranging from slightly to extremely harmful:
   1) Slightly harmful, for example:
      i) superficial injuries; minor cuts and bruises; eye irritation from dust; and
      ii) nuisance and irritation (for example headaches); ill-health leading to temporary discomfort.
   2) Harmful, for example:
      i) lacerations; burns;
      ii) contusion; serious sprains;
      iii) minor fractures;
      iv) deafness; dermatitis, asthma;
      v) work related upper limb disorders; and
      vi) disorders; ill-health leading to permanent minor disability.
   3) Extremely harmful, for example:
      i) amputations; major fractures;
      ii) poisonings; multiple injuries;
      iii) fatal injuries;
      iv) occupational cancer; other severely life shortening diseases;
      v) acute fatal diseases; and
      vi) occupational diseases.

7.2.2.2 *Property damage*

Information obtained about work activities (*see* **6.4**) is a vital input to risk assessment. When seeking to establish potential severity of harm, the following should also be considered:

- a) Part(s) of the body likely to be affected;
- b) Nature of the harm, ranging from slightly to extremely harmful:
   1) Slightly harmful, for example:
      i) superficial injuries; minor cuts and bruises; eye irritation from dust;
      ii) nuisance and irritation (for example headaches); ill-health leading to temporary discomfort.
   2) Harmful, for example:
      i) lacerations; burns;
      ii) contusion; serious sprains;
      iii) minor fractures;
      iv) deafness; dermatitis; asthma;

Sl No. (1)	*Property Damage* (2)	*Small Scale Organization* (3)	*Medium Scale Organisation* (4)	*Large Scale Organisation* (5)
i)	Slightly harmful	Less than Rs. 25 000/-*	Less than Rs. 1,00,000/-*	Less than Rs. 10 Lakhs *
ii)	Harmful,	Rs. 25 000/- to Rs. 1 lakh*	Rs. 1 lakh to Rs. 10 lakhs*	Rs. 10 lakhs to Rs. 50 lakhs*
iii)	Extremely harmful	More than 1 lakh*	More than 10 lakhs*	More than 50 lakhs*

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*all above amounts are indicative, the organization should decide the criteria considering their turnover.

  - v) work related upper limb disorders; and
  - vi) disorders; ill-health leading to permanent minor disability;

3) Extremely harmful, for example:
  - i) amputations; major fractures;
  - ii) poisonings; multiple injuries;
  - iii) fatal injuries;
  - iv) occupational cancer; other severely life shortening diseases; and
  - v) acute fatal diseases.

7.2.2.3 *Business interruption*

Business interruption may be loss of production, delay of production etc due to accidents, machine breakdown, internal issues etc:

Sl No. (1)	*Damage* (2)	*Business Interruption** (3)
i)	Slightly harmful	Upto 1 day*
ii)	Harmful,	More than 1 day and day upto one week *
iii)	Extremely harmful	More than one week*

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*Organizations may form their own norms considering statutory norms, non-statutory norms and their own norms.

7.2.2.4 *Environmental damage*

Environmental damage means pollution of air, water, soil, ill effects on living organisms etc:

Sl No. (1)	*Environmental Damage* (2)	*Scale of Environmental Damage** (3)
i)	Slightly harmful	Less than the environmental norms
ii)	Harmful,	More than the environmental norms within the factory
iii)	Extremely harmful	More than the environmental norms outside the factory, offsite emergency

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*Organizations may form their own norms considering statutory norms, non-statutory norms and their own norms.

7.2.3 *Likelihood of Harm*

When seeking to establish likelihood of harm the adequacy of control measures already implemented and complied with needs to be considered. Here legal requirements and codes of practice are good guides covering controls of specific hazards. The following issues should then typically be considered in addition to the work activity information given in **6.4**:

a) Number of personnel exposed;
b) Frequency and duration of exposure to the hazard;
c) Failure of services for example, electricity and water;
d) Failure of plant and machinery components and safety devices;
e) Protection afforded by personal protective equipment and usage rate of personal protective equipment; and
f) Unsafe acts (unintended errors or intentional violations of procedures) by persons, for example, who:
    1) may not know what the hazards are;
    2) may not have the knowledge, physical capacity, or skills to do the work;
    3) underestimate risks to which they are exposed; and
    4) underestimate the practicality and utility of safe working methods.

It is important to take into account the consequences of unplanned events. These subjective risk estimations should normally take into account all the people exposed to a hazard. Thus, any given hazard is more serious if it affects a greater number of people. But some of the larger risks may be associated with an occasional task carried out just by one person, for example, maintenance of inaccessible parts of lifting equipment.

8 EVALUATION OF RISK

8.1 Risk Tolerance

Table 1 shows one simple method for estimating risk levels and for deciding whether risks are tolerable. Risks are classified according to their estimated likelihood and potential severity of harm. Some organizations may wish to develop more sophisticated approaches, but this method is a reasonable starting point. Numbers may be used to describe risks, instead of the terms ‘moderate risk’, ‘substantial risk’, etc.

8.2 Risk Control Action Plan

An approach, again suggested as a starting point, is shown in Table 2. It shows that control measures and urgency should be proportional to risk. The outcome of a risk assessment should be an inventory of actions, in priority order, to devise, maintain or improve controls. A procedure for planning the implementation of necessary changes following risk assessment is described in **8.4**.

8.2.1 *Eliminating Hazards and Reducing OH&S Risks*

The organization should establish, implement and maintain a process(es) for the elimination of hazards and reduction of risks using the following 'hierarchy of control':

a) eliminate the hazard;
b) substitute with less hazardous processes, operations, materials or equipment;
c) use engineering controls and reorganization of work;
d) use administrative controls, including training; and
e) use adequate personal protective equipment.

8.2.2 *Management of Change*

The organization should establish a process(s) for the implementation and control of planned temporary and permanent changes that impact associated risks including:

a) new products, services and processes, or changes to existing products, services and processes, including:
    1) workplace locations and surroundings;
    2) work organization;
    3) working conditions;
    4) equipment;
    5) work force;
b) changes to legal requirements and other requirements;
c) changes in knowledge or information about hazards; and
d) developments in knowledge and technology.

The organization should review the consequences of unintended changes, taking action to mitigate any adverse consequence, as necessary.

Table 1 Simple Risk Level Estimator

(*Clauses* 6.1 *and* 8.1)

Sl No. (1)	**Probability of Occurrence** (2)	**Slightly Harmful** (3)	**Harmful** (4)	**Extremely Harmful** (5)
i)	High unlikely	Trivial risk	Tolerable risk	Moderate risk
ii)	Unlikely	Tolerable risk	Moderate risk	Substantial risk
iii)	Likely	Moderate risk	Substantial risk	Intolerable risk

NOTE — Tolerable here means that risk has been reduced to the lowest level that is reasonably practicable

Table 2 Simple Risk Based Control Plan

(*Clauses* 6.1 *and* 8.2)

Sl No. (1)	**Risk Level** (2)	**Action and Time Scale** (3)
i)	Trivial	No action is required and no documentary record needs to be kept.
ii)	Tolerable	No additional controls are required. Consideration may be given to a more cost-effective solution or improvement that imposes no additional cost burden. Monitoring is required to ensure that the controls are maintained.
iii)	Moderate	Efforts should be made to reduce the risk, but the cost of prevention should be carefully measured and limited. Risk reduction measures should be implemented.
iv)	Substantial	Work should not be started until the risk has been reduced. Considerable resources may have to be allocated to reduce the risk where the risk involves work in progress, urgent action should be taken.
v)	Intolerable	Work should not be started or continued until the risk has been reduced. If it is not possible to reduce risk even with unlimited resources, work has to remain prohibited.

8.3 Adequacy of Action Plan

The action plan should be reviewed before implementation, typically by asking:

a) Do people affected think about the need for, and feasibility of, the revised preventive measures?

b) Will Will the revised controls lead to tolerable risk levels?

c) Are new hazards created?

d) Has the most cost-effective solution been chosen?

.

e) What the revised controls be used in practice, and not ignored in the face of for example, pressures to get the job done?

8.4 Changing Conditions and Revising

Risk assessment should be seen as a continual process. Thus, the adequacy of control measures should be subject to continual review and revised if necessary. Similarly, if conditions change to the extent that hazards and risks are significantly affected then risk assessments should also be reviewed.

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Occupational Safety and Health Sectional Committee, CHD 08

Organization	*Representative(s)*
National Safety Council, Navi Mumbai	Shri Lalit R. Gabhane **(*Chairperson*)**
3M India Limited, Bengaluru	Shri Giridhar M. Shri Rishi Raj Arya (*Alternate* I) Shri Bidyut Chetia (*Alternate* II)
Atomic Energy Regulatory Board, Mumbai	Shri Diptendu Das Srimati Pammy Goswami (*Alternate* I) Shri Pavan Kumar Patel (*Alternate* II)
Bhabha Atomic Research Centre, Mumbai	Shri G. Nagaraju Shri Praveen Dubey (*Alternate*)
CSIR - Central Institute for Mining and Fuel Research, Dhanbad	Dr J. K. Pandey
CSIR - Central Institute of Toxicology Research, Lucknow	Dr D. K. Patel Dr Sheelendra Pratap Singh (*Alternate*)
CSIR - Indian Leather Research Institute, Chennai	Shri M. Surianarayanan
Centre for Fire and Explosive Environment Safety, Defence Institute of Fire Research, Delhi	Dr Arti Bhatt Dr S. Marry Celin (*Alternate*)
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Confederation of Indian Industry, New Delhi	Shri Shikhar Jain Shrimati Anjali (*Alternate*)
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